STIC Search Report
EIC 1700

STIC Database Tracking Number: 113151

TO:	From:
Raymond Alejandro Location: REM 6B59 Art Unit : 1745 February 4, 2004 Case Serial Number: 10/023907	Michael Newell Location: EIC 1700 REMSEN 4A30 Phone: 571/272-2538 MNewell@uspto.gov

Search Notes

STIC Search Results Feedback Form

EIC17000

Questions about the scope or the results of the search? Contact ***the EIC searcher or contact*:**

Kathleen Fuller, EIC 1700 Team Leader
571/272-2505 REMSEN 4B28

Voluntary Results Feedback Form

- *I am an examiner in Workgroup:* ☐ *Example: 1713*
- *Relevant prior art **found**, search results used as follows:*
  - ☐ 102 rejection
  - ☐ 103 rejection
  - ☐ Cited as being of interest.
  - ☐ Helped examiner better understand the invention.
  - ☐ Helped examiner better understand the state of the art in their technology.

Types of relevant prior art found:

- ☐ Foreign Patent(s)
- ☐ Non-Patent Literature
  (journal articles, conference proceedings, new product announcements etc.)

- *Relevant prior art **not found**:*
  - ☐ Results verified the lack of relevant prior art (helped determine patentability).
  - ☐ Results were not useful in determining patentability or understanding the invention.

Comments:

Drop off or send completed forms to EIC1700 REMSEN 4B28

```
=> d his full

     (FILE 'HOME' ENTERED AT 09:34:43 ON 04 FEB 2004)

     FILE 'HCAPLUS, WPIX, JAPIO' ENTERED AT 09:35:08 ON 04 FEB 2004
L1         79188 SEA FUEL? (2A) CELL?
L2          2883 SEA POLYMER?(2A) ELECTROLYTE?(2A) MEMBRANE?
L3          2587 SEA PEM
L4          5113 SEA L2 OR L3
L5          3679 SEA (MEMBRANE(2A) ELECTRODE?(2A) ASSEMBL?) OR MEA
L6        319838 SEA (GAS OR GASES OR GASSES)(4A)(SEPARAT? OR SEGREGAT?
                 OR SEAL? OR DISTRIBUT? OR FLOW OR FLOWS)
L7          9185 SEA SOLID(3A) POLYMER?(3A) ELECTROLYT?
L8         11023 SEA L2 OR L7
L9       1025059 SEA MANIFOLD? OR GASKET? OR APERTURE? OR INLET? OR
                 OUTLET?
L10       365734 SEA (GAS OR GASES OR GASSES)(4A)(SEPARAT? OR SEGREGAT?
                 OR SEAL? OR DISTRIBUT? OR FLOW OR FLOWS OR MIX OR MIXES
                 OR MIXING OR LEAK OR LEAKS OR LEAKING OR LEAKAGE)
L11        13221 SEA L2 OR L4 OR L7
L12           61 SEA L1 AND L11 AND L5 AND L10
L13           16 SEA L12 AND L9
                 D TI L13 1-16
L14           45 SEA L12 NOT L13
                 D TI L14 1-45
L15           61 SEA L12 AND L5
L16          896 SEA L1 AND (L11 OR L5) AND L10
L17          207 SEA L16 AND L9
L18          122 SEA L17 AND ((2002-2004)/PY OR (2002-2004)/PRY)
                 D CBIB 1
L19           85 SEA L17 NOT L18
L20        10064 SEA CONDUCT? (2A) SEPARAT?
L21           10 SEA L19 AND L20
                 D TI 1-10
L22           75 SEA L19 NOT L21
                 D TI 1-75
L23           10 DUP REMOVE L21 (0 DUPLICATES REMOVED)
L24           70 DUP REMOVE L22 (5 DUPLICATES REMOVED)
                 D TI 1-70


     FILE HOME

     FILE HCAPLUS

     Copyright of the articles to which records in this database refer is
     held by the publishers listed in the PUBLISHER (PB) field (available
     for records published or updated in Chemical Abstracts after Decembe
```

FILE COVERS 1907 - 4 Feb 2004 VOL 140 ISS 6
FILE LAST UPDATED: 3 Feb 2004 (20040203/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

FILE WPIX
FILE LAST UPDATED: 2 FEB 2004 <20040202/UP>
MOST RECENT DERWENT UPDATE: 200408 <200408/DW>
DERWENT WORLD PATENTS INDEX SUBSCRIBER FILE, COVERS 1963 TO DATE

>>> NEW WEEKLY SDI FREQUENCY AVAILABLE --> see NEWS <<<

>>> SLART (Simultaneous Left and Right Truncation) is now available in the /ABEX field. An additional search field /BIX is also provided which comprises both /BI and /ABEX <<<

>>> PATENT IMAGES AVAILABLE FOR PRINT AND DISPLAY <<<

>>> FOR A COPY OF THE DERWENT WORLD PATENTS INDEX STN USER GUIDE, PLEASE VISIT:
http://www.stn-international.de/training_center/patents/stn_guide.p

>>> FOR DETAILS OF THE PATENTS COVERED IN CURRENT UPDATES, SEE http://thomsonderwent.com/coverage/latestupdates/ <<<

>>> FOR INFORMATION ON ALL DERWENT WORLD PATENTS INDEX USER GUIDES, PLEASE VISIT:
http://thomsonderwent.com/support/userguides/ <<<

>>> ADDITIONAL POLYMER INDEXING CODES WILL BE IMPLEMENTED FROM DERWENT UPDATE 200403.
THE TIME RANGE CODE WILL ALSO CHANGE FROM 018 TO 2004.
SDIS USING THE TIME RANGE CODE WILL NEED TO BE UPDATED.
FOR FURTHER DETAILS: http://thomsonderwent.com/chem/polymers/ <<

FILE JAPIO
FILE LAST UPDATED: 3 FEB 2004 <20040203/UP>

FILE COVERS APR 1973 TO OCTOBER 31, 2003

<<< GRAPHIC IMAGES AVAILABLE >>>

=> d l21 1-6 cbib abs hitstr hitind

L21 ANSWER 1 OF 10 HCAPLUS COPYRIGHT 2004 ACS on STN
2001:469480 Document No. 135:63787 **Conductive separator**, polymer-electrolyte **fuel cell**, and its manufacture. Ohara, Hideo; Arakura, Junji; Hado, Kazuhito (Matsushita Electric Industrial Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001176519 A2 20010629, 9 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-355549 19991215.

AB The separator is equipped with a metal sheet having grooves or ribs and contacted at an electrode and sealing parts for forming an **inlet** and an **outlet** of **gas** passages and preventing **gas leakage**, where the **sealing** parts consist of plural elastic materials having different hardness. Claimed **fuel cell** is equipped with the separator alternately laminated with a **polymer-electrolyte membrane/electrode assembly** (**MEA**). The **fuel cell** is manufd. by (1) laminating the separator with **MEA**, (2) coating a sealing adhesive on the side, (3) hardening the adhesive and cutting, and then (4) placing a **manifold**. The **fuel cell** has high sealing property and is obtained at low cost.

IC ICM H01M008-02
ICS H01M008-02; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **conductive separator fuel cell** sealing rubber

IT **Fuel cell** separators
Gaskets
Solid state **fuel cells**
(**polymer-electrolyte fuel cell** contg. **conductive separator** sealed with rubber)

IT Fluoro rubber
Styrene-butadiene rubber, uses
(polymer-electrolyte **fuel cell** contg. **conductive separator** sealed with rubber)

IT 11107-04-3, SUS316
(polymer-electrolyte **fuel cell** contg. **conductive separator** sealed with rubber)

IT 9003-55-8
(styrene-butadiene rubber, polymer-electrolyte **fuel cell** contg. **conductive separator**

sealed with rubber)

L21 ANSWER 2 OF 10 HCAPLUS COPYRIGHT 2004 ACS on STN
2001:356684 Document No. 134:342548 Polymer electrolyte **fuel cells**. Yamazaki, Tatsuhito; Ohara, Hideo; Sugawara, Yasushi; Shinkura, Junji; Hato, Kazuhito; Takeguchi, Shinsuke (Matsushita Electric Industrial Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001135342 A2 20010518, 8 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-313041 19991102.

AB The **fuel cells** have a stack of unit cells contg. a **polymer electrolyte membrane** held between a cathode and an anode, anode side **conductive separator** having fuel **gas** passages, and cathode side **conductive separator** having oxidant **gas** passages; where the fuel passages and oxidant gas passage of the unit cells have 1 end open in sep. rows in the stack direction at 1 side of the stack, the other ends of the fuel passages and oxidant gas passages form sep. rows at the opposite side of the stack, external **manifolds** having fuel gas and oxidant gas grooves attached via an airtight material to the opposite sides of the stack, and an **gas sealing** material filled at the grooved formed on the opposite side of the stack between the rows of the openings of the fuel gas passages and the oxidant **gas** passages top prevent cross **leaking** of the reaction **gases.**

IC ICM H01M008-24
ICS H01M008-02; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST polymer electrolyte **fuel cell** sealing structure

IT **Fuel cells**
Seals (parts)
(sealing structure of polymer electrolyte **fuel cell** stacks between reaction gas **manifolds** and the stack)

IT 9003-27-4D, Poly(iso-butylene), oligomer
(sealing structure of polymer electrolyte **fuel cell** stacks between reaction gas **manifolds** and the stack)

L21 ANSWER 3 OF 10 HCAPLUS COPYRIGHT 2004 ACS on STN
2001:356683 Document No. 134:342547 Polymer electrolyte **fuel cells** and their manufacture. Sugawara, Yasushi; Ohara, Hideo; Yamazaki, Tatsuto; Shinkura, Junji; Hato, Kazuhito; Takeguchi, Shinsuke (Matsushita Electric Industrial Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001135341 A2 20010518, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-312737 19991102.

AB The **fuel cells** have unit cells, contg. a **polymer electrolyte membrane** held

between a pair of catalytic electrodes, stacked alternately with **conductive separators** having fuel and oxidant distributing means on opposite sides with the electrode edges reaching the sides of the stack, insulators forming **gas seals** between the electrodes and the separators at the sides of the stack, and reaction gas **inlet** and **outlet manifolds** installed at the sides of the stack; where the **manifolds** are rigid pieces and the seals are elastic pieces. The **fuel cells** are prepd. by stacking the unit cells and the **separators**, forming the insulator **gas seals** at the sides of the stack, and attaching the **manifolds** to the stack, with the **gas seals** and an airtight material between the **manifolds** and the stack.

IC ICM H01M008-24
ICS H01M008-24; H01M008-10
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST polymer electrolyte **fuel cell** manuf elastic seal; elastic insulator seal polymer electrolyte **fuel cell**
IT Electric insulators
Fuel cells
Seals (parts)
(structure and manuf. of polymer electrolyte **fuel cell** stacks contg. elastic insulator **gas seals**)

L21 ANSWER 4 OF 10 HCAPLUS COPYRIGHT 2004 ACS on STN
2000:49091 Document No. 132:80972 **Solid polymer electrolyte fuel cells.** Nishida, Kazushi; Yasumoto, Eiichi; Gyoten, Jiro; Hato, Kazuhito; Uchida, Makoto; Ohara, Hideo; Sugawara, Yasushi; Kanbara, Teruhisa; Matsumoto, Toshihiro (Matsushita Electric Industrial Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2000021418 A2 20000121, 8 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1998-183752 19980630.

AB The **fuel cells** have unit cells, contg. an electrolyte membrane held between an electrode pair and means supplying and discharging fuel gas to and from cell anodes, stacked alternately with **conductive** metal **separators**; where the separators have an oxidn. resistant metal surface, grooved fuel **gas** passages, and **gas sealing manifolds** for connecting the grooves to the fuel supplying and discharging means. The oxidn. resistant surface may be Ag or Au.

IC ICM H01M008-02
ICS H01M008-02; H01M008-10
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST polymer electrolyte **fuel cell** separator;

fuel cell separator oxidn resistant coating; gold coating **fuel cell** separator; silver coating **fuel cell** separator

IT **Fuel cell** separators
(grooved metal separators with oxidn. resistant coatings for polymer electrolyte **fuel cells**)

IT 11107-04-3, Sus 316
(grooved metal separators with oxidn. resistant coatings for polymer electrolyte **fuel cells**)

IT 7440-22-4, Silver, uses 7440-57-5, Gold, uses
(grooved metal separators with oxidn. resistant coatings for polymer electrolyte **fuel cells**)

L21 ANSWER 5 OF 10 HCAPLUS COPYRIGHT 2004 ACS on STN

1996:731901 Document No. 125:334166 **Solid polymer electrolyte fuel cell** stacks. Shimotori, Soichiro; Muku, Yoshiharu; Muneuchi, Atsuo; Murata, Kenji (Tokyo Shibaura Electric Co, Japan). Jpn. Kokai Tokkyo Koho JP 08250130 A2 19960927 Heisei, 14 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1995-56146 19950315.

AB The stacks contain alternate **conductive separators** and **fuel cells** having a pair of gas permeable electrode on the opposite sides of a **polymer electrolyte membrane**, a pair of collectors contacting the electrodes and having reaction gas passage grooves on the contacting side, and reaction **gas distributing manifold** for the grooves; where each separator is bonded at least on 1 side to a collector frame, the collector is bonded by a conductive adhesive to the separator within the frame, an internal **manifold** is bonded to the separator between the frame and the collector, and a **manifold** cover having an opening facing the grooves is bonded to the frame.

IC ICM H01M008-02
ICS H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **solid polymer electrolyte fuel cell** structure

IT **Fuel cells**
(structure of **solid polymer electrolyte fuel cell** stacks)

L21 ANSWER 6 OF 10 HCAPLUS COPYRIGHT 2004 ACS on STN

1996:315461 Document No. 124:348144 **Solid polymer electrolyte fuel cells.** Kadoma, Shigeki (Tokyo Shibaura Electric Co, Japan). Jpn. Kokai Tokkyo Koho JP 08088018 A2 19960402 Heisei, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1994-221443 19940916.

AB The **fuel cells** have a stack of

conductive separators and unit cells, each contg. an electricity generating element surrounded by **manifolds** for **distributing** reaction **gases** and coolant for the element, and a device for pressing the stack in the stacking direction, where the pressing device contains 1st means for pressing the **manifolds** and 2nd means for pressing the electricity generating elements. The **fuel cells** may also have a pair of end plates at the opposite ends of the stack and a pair of pressing plates outside the end plates, where either or both of the end plates have a sepd. center part facing the electricity generating element and a frame part facing the **manifolds**, and the neighboring pressing plate has means for adjusting pressure asserted on the center part. This structure provides good sealing for the **fuel cells**.

IC ICM H01M008-24
ICS H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST polymer electrolyte **fuel cell** press sealing

IT **Fuel cells**
Seals (mechanical)
(pressing structure of **solid polymer electrolyte fuel cell** stacks for improved sealing)

=> d l21 7-10 ibib abs ind

L21 ANSWER 7 OF 10 JAPIO (C) 2004 JPO on STN
ACCESSION NUMBER: 2000-067900 JAPIO
TITLE: POLYMER ELECTROLYTE **FUEL CELL**
INVENTOR: KANBARA TERUHISA; GYOTEN HISAAKI; HADO KAZUHITO; NISHIDA KAZUFUMI; UCHIDA MAKOTO; YASUMOTO EIICHI; SUGAWARA YASUSHI; OBARA HIDEO; MATSUMOTO TOSHIHIRO
PATENT ASSIGNEE(S): MATSUSHITA ELECTRIC IND CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2000067900	A	20000303	Heisei	H01M008-24

APPLICATION INFORMATION
STN FORMAT: JP 1998-234761 19980820
ORIGINAL: JP10234761 Heisei
PRIORITY APPLN. INFO.: JP 1998-234761 19980820
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2000
AN 2000-067900 JAPIO

AB PROBLEM TO BE SOLVED: To provide a miniaturized and compact polymer electrolyte **fuel cell** excellent in its reliability for **gas sealing**.
SOLUTION: This polymer electrolyte **fuel cell** is formed by laminating plural cells equipped with a **solid polymer electrolyte** film, a pair of electrodes with a catalysis reaction layer placed so as to sandwich the polymer electrolyte film, and a means for supplying and **distributing** fuel **gas** containing hydrogen to one electrode and supplying and **distributing** oxidizer **gas** containing oxygen to the other electrode, through a **conductive separator**, and a **gas manifold** 17 for supplying and exhausting the fuel gas and the oxidizer gas to the cell is disposed on the side of the laminated **fuel cell** in parallel with its longitudinal direction.

IC ICM H01M008-24
ICS H01M008-10

L21 ANSWER 8 OF 10 JAPIO (C) 2004 JPO on STN
ACCESSION NUMBER: 2000-021420 JAPIO
TITLE: SOLID HIGH POLYMER **FUEL CELL**
INVENTOR: KANBARA TERUHISA; GYOTEN HISAAKI; HADO KAZUHITO; YASUMOTO EIICHI; NISHIDA KAZUFUMI; UCHIDA MAKOTO; SUGAWARA YASUSHI; OBARA HIDEO; MATSUMOTO TOSHIHIRO
PATENT ASSIGNEE(S): MATSUSHITA ELECTRIC IND CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2000021420	A	20000121	Heisei	H01M008-02

APPLICATION INFORMATION
STN FORMAT: JP 1998-183760 19980630
ORIGINAL: JP10183760 Heisei
PRIORITY APPLN. INFO.: JP 1998-183760 19980630
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2000
AN 2000-021420 JAPIO
AB PROBLEM TO BE SOLVED: To reduce cost at mass producing, and to reduce the size by providing a pair of electrodes for sandwiching a **solid** high **polymer electrolyte** film and a supply discharge means of fuel **gas**, constituting a **conductive separator** between laminated cells out of a metal plate of a conductive inorganic compound coat, and connecting the gas flowing hole to the fuel gas supply discharge

means by a **gas sealing** material.
SOLUTION: A **conductive separator** is formed in a wave shape by press working out of, for example, a SUS 316 plate and is obtained by forming conductive inorganic oxide such as tin oxide of In doping or an inorganic conductive nitride and carbide on the surface. A phenol groove 6 is formed of a phenol projecting part 7, up to a gas flowing groove from a **manifold** hole 4 in hydrogen side and air side separators. An electrode/electrolyte jointing body having positive/negative electrode catalyst layers jointed to both surfaces of a proton conductive high polymer electrolyte film, is sandwiched by two kinds of separators, and the phenol **gasket** 7. This separator is chemically inactive with respect to acidic atmosphere, can be made thin and cutting work can be obviated.

IC ICM H01M008-02
ICS H01M008-10

L21 ANSWER 9 OF 10 JAPIO (C) 2004 JPO on STN
ACCESSION NUMBER: 2000-021419 JAPIO
TITLE: **SOLID** HIGH **POLYMER ELECTROLYTE FUEL CELL**
INVENTOR: NISHIDA KAZUFUMI; YASUMOTO EIICHI; GYOTEN HISAAKI; HADO KAZUHITO; UCHIDA MAKOTO; OBARA HIDEO; SUGAWARA YASUSHI; KANBARA TERUHISA; MATSUMOTO TOSHIHIRO
PATENT ASSIGNEE(S): MATSUSHITA ELECTRIC IND CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2000021419	A	20000121	Heisei	H01M008-02

APPLICATION INFORMATION
STN FORMAT: JP 1998-183757 19980630
ORIGINAL: JP10183757 Heisei
PRIORITY APPLN. INFO.: JP 1998-183757 19980630
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2000
AN 2000-021419 JAPIO
AB PROBLEM TO BE SOLVED: To reduce a cost at mass production time, and to reduce the size by providing a pair of electrodes for sandwiching a **solid** high **polymer electrolyte** film and a supply discharge means of fuel **gas**, constituting a **conductive separator** between laminated cells out of metal having a carbon conductive layer on the surface, and connecting the gas flowing hole to the fuel gas supply discharge means by a **gas sealing** material.

SOLUTION: A **conductive separator** is preferably formed by rolling of a roller after applying/drying a conductive agent is mainly composed of graphite and carbon black to/on a spongy nickel which porous body. A phenol groove 6 is formed of the phenol projecting surface 5 up to a wavy gas flowing groove by press working from a **manifold** hole 4 on hydrogen side and air side separators. An electrode/electrolyte jointing body having positive/negative electrode catalyst layers jointed to both surfaces of a proton conductive high polymer electrolyte film, is sandwiched by two kinds of separators and a phenol- made **gasket** 7. This separator is chemically inactive to an acidic atmosphere and can be thinned and cutting work can be obviated.

IC ICM H01M008-02
ICS H01M008-10

L21 ANSWER 10 OF 10 JAPIO (C) 2004 JPO on STN
ACCESSION NUMBER: 2000-021418 JAPIO
TITLE: **SOLID** HIGH **POLYMER ELECTROLYTE FUEL CELL**
INVENTOR: NISHIDA KAZUFUMI; YASUMOTO EIICHI; GYOTEN HISAAKI; HADO KAZUHITO; UCHIDA MAKOTO; OBARA HIDEO; SUGAWARA YASUSHI; KANBARA TERUHISA; MATSUMOTO TOSHIHIRO
PATENT ASSIGNEE(S): MATSUSHITA ELECTRIC IND CO LTD
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2000021418	A	20000121	Heisei	H01M008-02

APPLICATION INFORMATION
STN FORMAT: JP 1998-183752 19980630
ORIGINAL: JP10183752 Heisei
PRIORITY APPLN. INFO.: JP 1998-183752 19980630
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2000

AN 2000-021418 JAPIO
AB PROBLEM TO BE SOLVED: To reduce cost at mass producing, and to reduce size by providing a pair of electrodes for sandwiching a **solid** high **polymer electrolyte** film and a supply discharge means of fuel **gas**, constituting a **conductive separator** between laminated cells out of metal having an inactive metallic layer on the surface in an acidic atmosphere, and connecting the gas flowing groove to the gas supply discharge means by a **gas sealing** material.
SOLUTION: A **conductive separator** is preferably

consists an SUS 316 plate having the surface plate with gold and silver, and on the hydrogen side, a gas guiding phenol groove 6 up to a wavy gas flowing groove is formed of the phenol projecting part 5 from a **manifold** hole 4 through press working. A curved continuing gas flowing groove is arranged in an air side separator. An electrode/electrolyte jointing body having a positive/negative electrode catalyst layer jointed to both surfaces of the central part of a proton conductive high polymer electrolyte film, is sandwiched by two kinds of separators and a **gasket** to become a constituting unit of a **fuel cell**. The separator can be formed thinner than a carbon plate by obviating cutting work.

IC ICM H01M008-02
ICS H01M008-10

=> d l22 1-40 cbib abs hitstr hitind

L22 ANSWER 1 OF 75 HCAPLUS
2002:437488 Document No. 137:250105 Cold controlled combustion in **fuel cells**. Datta, Ravindra; Fishtik, Ilie (Fuel Cell Center Department of Chemical Engineering, Worcester Polytechnic Institute, Worcester, MA, 01609, USA). Chemical and Physical Processes in Combustion 1-6 (English) 2001. CODEN: CPPCD9. ISSN: 0277-1128. Publisher: Combustion Institute.

AB A review on the practical and theor. challenges in **fuel cell** technol., focusing on the proton-exchange membrane (**PEM**) **fuel cells** operating on hydrogen and oxygen gases from air. The **PEM fuel cell** structure is an intricate five-layer composite, and the typical lab. **fuel cell** consists of two graphite end-plates with mcro-machined flow channels for feed introduction and current collection, that sandwich two carbon-cloth gas-diffusion backings, each serves as electron collector and permeator for gases as well as for liq. water, and a **membrane-electrode assembly** consisting of a **PEM** serving as the proton conductor and H2/O2 **gas separator**, with hot-pressed anode and cathode on either side, sealed together with **gaskets**. The **PEM** requires liq. water for effective proton transport which limits the practical operating temp. of atm. **fuel cells** to .ltoreq. 80.degree., when water vapor pressure is half an atm.

CC 52-0 (Electrochemical, Radiational, and Thermal Energy Technology)
ST review proton exchange membrane **fuel cell**
IT **Fuel cells**
(proton-exchange membrane; development of proton-exchange membrane **fuel cells** operated on H2 and O2

from air)
IT 1333-74-0, Hydrogen, uses
(development of proton-exchange membrane **fuel cells** operated on H2 and O2 from air)

L22 ANSWER 2 OF 75 HCAPLUS COPYRIGHT 2004 ACS on STN
2002:406579 Document No. 136:388144 Water as a propellant for spacecraft propulsion. Smith, Peter (Polyflex Aerospace Ltd, Cheltenham, GL51 8LZ, UK). European Space Agency, [Special Publication] SP, SP-484(Proceedings of the First International Conference on Green Propellants for Space Propulsion, 2001), 364-368 (English) 2001. CODEN: ESPUD4. ISSN: 0379-6566. Publisher: ESA Publications Division.
AB The recent interest in and development of catalytic **fuel cells** for the generation of electricity from hydrogen-oxygen reactions, using; alc. as the propellant, has also advanced the status of **solid polymer electrolytes**. These electrolytes can also be used in reverse, in which power is applied to the cell, together with water, resulting in the electrolysis of the water into hydrogen and oxygen. In earlier treatments of spacecraft propulsion systems based on water electrolysis, the hydrogen and oxygen were sepd. at the cell, and recombined in a bipropellant thruster downstream. However, in this paper the **gases** are allowed to **mix** in the cell, and are treated as a monopropellant, thereby simplifying the system design. The propulsion system discussed in the paper is therefore based on the development of two new components. These are: a water electrolysis cell, capable of converting water into a hydrogen and oxygen mixt. with reasonable efficiency; and a monopropellant thruster and **inlet** valve, the thruster being fitted with a spark generator and a flame holder. This paper describes the water electrolysis system and compares its overall performance against conventional hot and cold gas chem. propulsion systems.
CC 50-7 (Propellants and Explosives)

L22 ANSWER 3 OF 75 HCAPLUS COPYRIGHT 2004 ACS on STN
2001:632221 Document No. 135:183313 **Fuel cell** stacks. Komura, Takashi; Sugita, Shigetoshi; Inai, Shigeru (Honda Motor Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001236975 A2 20010831, 12 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-45002 20000222.
AB The horizontal **fuel cell** stacks have unit cells, contg. a **polymer electrolyte membrane** between a cathode and an anode, and separators holding the unit cells; where the **separators** have reaction **gas inlet** and **outlet** through holes at their edge parts, and when viewed from the discharge side of the **outlet** through hole of a reaction gas, the **inlet** opening of the

reaction gas is at the far end of the separator.
IC ICM H01M008-02
ICS H01M008-10
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **fuel cell separator** reaction **gas** passage
IT **Fuel cell separators**
(arrangement of reaction **gas** passages on polymer electrolyte **fuel cell** separators)

L22 ANSWER 4 OF 75 HCAPLUS COPYRIGHT 2004 ACS on STN
2001:541933 Document No. 135:124984 Polymer electrolyte **fuel cell** stack for stable power generation. Ooma, Atsushi; Kogami, Taiji; Hori, Michio (Toshiba Corp., Japan). Jpn. Kokai Tokkyo Koho JP 2001202984 A2 20010727, 11 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-10698 20000119.
AB In the stack, each **separator** has a **gas-flow**-control **manifold** connected to a gas-**inlet manifold** via a gas-diverging groove. Oxidizing gas or fuel gas supplied into the the **gas-flow**-control **manifold flows** into the **gas-inlet manifold** via the groove, so that distribution of the static pressure of the gas in the gas-**inlet manifold** becomes uniform. When the gas contains condensed water, it can be filtered at the groove and discharged from the **gas-flow**-control **manifold**. Alternatively, each **separator** may have a **gas-inlet manifold** through which a jig with a diam. .gtoreq.1/2 time the width of the **manifold** is inserted for dividing the **manifold** into 2 regions and forming narrow **gas flow** spaces. The flow-control structure mentioned above may be applied also to water supply means for formation of water flow with uniform static pressure distribution.
IC ICM H01M008-24
ICS H01M008-24; H01M008-02; H01M008-04; H01M008-10
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST polymer electrolyte **fuel cell** stack uniform static pressure gas
IT **Solid** state **fuel cells**
(**polymer electrolyte fuel cell** stack having system for formation of **gas flow** with uniform static pressure distribution for stable power generation)

L22 ANSWER 5 OF 75 HCAPLUS COPYRIGHT 2004 ACS on STN
2001:414791 Document No. 135:21941 Polymer-electrolyte **fuel cell** containing water-absorbing body. Nakamoto, Hideo;

Hase, Nobuhiro; Yamamoto, Yoshiaki (Matsushita Electric Industrial Co., Ltd., Japan; Matsushita Refrigeration Co.). Jpn. Kokai Tokkyo Koho JP 2001155759 A2 20010608, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-339220 19991130.

AB The **fuel cell** is equipped with a proton-conducting **polymer electrolyte membrane** sandwiched between a pair of electrodes through catalyst layers to give a joint, which is alternately laminated with a **separator** having a **gas**-supplying groove, a **manifold** (A) for gas supply, and a **manifold** for gas discharge, where a water-absorbing body, e.g., foamed glass, is placed in the **manifold** A. The **fuel cell** provides stable humidity of the electrodes and is prevented from decrease of power generation performance caused by wetting of the separators.

IC ICM H01M008-24
ICS H01M008-02; H01M008-04; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST polymer electrolyte **fuel cell** water absorber foamed glass

IT **Solid** state **fuel cells**
(**polymer-electrolyte fuel cell** contg. water-absorbing body at gas-supplying **manifold**)

IT Foamed glass
(polymer-electrolyte **fuel cell** contg. water-absorbing body at gas-supplying **manifold**)

L22 ANSWER 6 OF 75 HCAPLUS COPYRIGHT 2004 ACS on STN

2001:336745 Document No. 134:342518 Polymer-electrolyte **fuel cell** with **separator** having folded oxygen **gas** passages. Sakai, Katsunori; Kuwahara, Takeshi; Aoki, Tsutomu (Toshiba Corp., Japan). Jpn. Kokai Tokkyo Koho JP 2001126746 A2 20010511, 18 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-302489 19991025.

AB The **fuel cell** is equipped with an oxidizing gas-supplying **manifold** (MA) and an oxidizing gas-discharging **manifold** (MB) placed at a separator contacting with a cathode in a stacked unit cells, where plural passages having folded structure are formed for passing the oxidizing gas from MA to MB to give opposed **flow** of the oxidizing **gas**. Optionally, the **fuel cell** is equipped with plural **manifolds** of drainage for dehumidifying. The **fuel cell** is suppressed from floodding caused by steam condensation at the gas-discharging **manifold** and shows large effective electrode area.

IC ICM H01M008-02
ICS H01M008-02; H01M008-06; H01M008-10; H01M008-24

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST separator polymer electrolyte **fuel cell**
IT **Fuel cell** separators
Solid state **fuel cells**
(**polymer-electrolyte fuel cell** with **separator** having folded oxygen **gas** passages)

L22 ANSWER 7 OF 75 HCAPLUS COPYRIGHT 2004 ACS on STN
2001:46246 Document No. 134:103277 Polymer electrolyte **fuel cells** using **gaskets**. Yamamoto, Ryoichi; Miyagawa, Norishige (Mitsubishi Plastics Industries, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001015133 A2 20010119, 4 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-187154 19990701.
AB The **fuel cells** contain elastomeric **gaskets** around unit cells. The **gaskets** are composed of high-hardness rubbers and low-hardness rubbers having differences in hardness (JIS K 6301, A-type) 20-40. The polymer electrolyte **fuel cells** show high **gas sealability** and can be manufd. with high productivity.
IC ICM H01M008-02
ICS H01M008-10
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 39
ST rubber **gasket** polymer electrolyte **fuel cell**
IT Silicone rubber, uses
(KE 1950-30; polymer electrolyte **fuel cells** using 2-component rubber **gaskets** for sealing)
IT Fluoro rubber
Synthetic rubber, uses
(perfluoro polyether-, Sifel 3701; polymer electrolyte **fuel cells** using 2-component rubber **gaskets** for sealing)
IT **Gaskets**
Solid state **fuel cells**
(**polymer electrolyte fuel cells** using 2-component rubber **gaskets** for sealing)
IT Fluoro rubber
(polymer electrolyte **fuel cells** using 2-component rubber **gaskets** for sealing)

L22 ANSWER 8 OF 75 HCAPLUS COPYRIGHT 2004 ACS on STN
2000:889564 Document No. 134:59090 **Fuel cell** stacks and their operation method. Shitaya, Yukio; Ishizawa, Masaki (Nippon Telegraph and Telephone Corp., Japan). Jpn. Kokai Tokkyo Koho JP 2000353536 A2 20001219, 6 pp. (Japanese). CODEN: JKXXAF.

APPLICATION: JP 1999-162152 19990609.

AB The **fuel cell** stacks have unit cells, contg. a **polymer electrolyte membrane** between a pair of **gas** permeable electrodes, a **separator** having fuel **gas inlet** and **outlet** grooves, and a **separator** having oxidant **gas inlet** and **outlet** grooves; where the separators have heat pipes connected to heat dissipating fins. In the operation of the **fuel cell** stack, the heat pipes serve as heat insulators for rapid heating of the cells during startup, and dissipate heat from the cells during normal operation.

IC ICM H01M008-04
ICS F28D015-02; H01M008-02; H01M008-10; H01M008-24

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST polymer electrolyte **fuel cell** separator heat pipe

IT **Fuel cells**
Heat pipes
(polymer electrolyte **fuel cell** stacks contg. heat pipes with attached heat dissipating fins)

L22 ANSWER 9 OF 75 HCAPLUS COPYRIGHT 2004 ACS on STN

2000:753396 Document No. 133:311749 Two-phase flow model of the cathode of **PEM fuel cells** using interdigitated flow fields. He, Wensheng; Yi, Jung S.; Van Nguyen, Trung (Dept. of Chemical and Petroleum Engineering, University of Kansas, Lawrence, KS, 66045, USA). AIChE Journal, 46(10), 2053-2064 (English) 2000. CODEN: AICEAC. ISSN: 0001-1541. Publisher: American Institute of Chemical Engineers.

AB When interdigitated **gas distributors** are used in a proton-exchange membrane (**PEM**) **fuel cell**, fluids entering the **fuel cell** are forced to flow through the electrodes porous layers. This characteristic increases transport rates of the reactants and products to and from the catalyst layers and reduces the amt. of liq. water entrapped in the porous electrodes thereby minimizing electrode flooding. To investigate the effects of the gas and liq. water hydrodynamics on the performance of an air cathode of a **PEM fuel cell** employing an interdigitated **gas distributor**, a 2-D, two-phase, multicomponent transport model was developed. Darcy's law was used to describe the transport of the gas phase. The transport of liq. water through the porous electrode is driven by the shear force of **gas flow** and capillary force. An equation accounting for both forces was derived for the liq. phase transport in the porous gas electrode. Higher differential pressures between **inlet** and **outlet** channels yield higher electrode performance, because the oxygen transport

rates are higher and liq. water removal is more effective. The electrode thickness needs to be optimized to get optimal performance because thinner electrode may reduce **gas-flow** rate and thicker electrode may increase the diffusion layer thickness. For a fixed-size electrode, more channels and shorter shoulder widths are preferred.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST model **PEM fuel cell** cathode flow

IT **Fuel cells**
(proton-exchange membrane; two-phase flow model of cathode of **PEM fuel cells** using interdigitated flow fields)

IT Flow
Fuel cell cathodes
Simulation and Modeling, physicochemical
(two-phase flow model of cathode of **PEM fuel cells** using interdigitated flow fields)

L22 ANSWER 10 OF 75 HCAPLUS COPYRIGHT 2004 ACS on STN

2000:313669 Document No. 132:323917 **Gas manifold** -having **separator** and its use in **solid polymer electrolyte fuel cell.**

Kuwahara, Yasuo; Ogura, Yoshikazu; Kajio, Katsuhiro (Aishin Seiki Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2000133289 A2 20000512, 8 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1998-307391 19981028.

AB The separator using a plate for covering gas **inlet** and gas **outlet** to form a tunnel structure, has (1) polymer-coated parts except for gas a passage groove or (2) polymer ribs for covering edge parts of the cover plate. The structure prevents **gas leak** from the cover plate.

IC ICM H01M008-02
ICS H01M008-02; H01M008-10; H01M008-24

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST **gas leak** prevention **separator** **fuel cell**; polymer coating rib separator **fuel cell**

IT Ethylene-propylene rubber
(coatings, ribs; **gas manifold**-having **separator** with polymer coatings or ribs for **gas leak** prevention in **solid polymer electrolyte fuel cell**)

IT Coating materials
Fuel cell separators
Seals (parts)
(**gas manifold**-having **separator** with polymer coatings or ribs for **gas leak**

prevention in **solid polymer electrolyte fuel cell**)

IT 9010-79-1
(ethylene-propylene rubber, coatings, ribs; **gas manifold**-having **separator** with polymer coatings or ribs for **gas leak** prevention in **solid polymer electrolyte fuel cell**)

L22 ANSWER 11 OF 75 HCAPLUS COPYRIGHT 2004 ACS on STN
2000:124893 Document No. 132:139686 Issues pertaining to PEMFC stack design. Ghosh, K. K.; Velayutham, G.; Dhathathreyan, K. S. (Centre for Electrochemical and Energy Research SPIC Science Foundation Guindy, Chennai, 600 032, India). Bulletin of Electrochemistry, 15(9-10), 385-388 (English) 1999. CODEN: BUELE6. ISSN: 0256-1654. Publisher: Central Electrochemical Research Institute.

AB A review with 12 refs. **Polymer electrolyte membrane fuel cell** (PEMFC) is being considered as one of the best candidates for applications like automobile and space. Performance of PEMFC stacks primarily depends on **membrane electrode assembly** and various component design of the stack. The art of **membrane electrode assembly** prepn. has been discussed extensively in open literature and is a subject of continued research. Most of the recent **fuel cell** stacks is mostly protected by patents. Most of the recent **fuel cell** stacks use internal **manifold** design. However, as the internal **manifolding** is parallel feed, changes of by-passing a cell is very common. The uniformity of vertical **gas distribution** in stack depends on the pressure drops in the channels and in **manifolds**. As the **gas** transverses over the **flow** field plate, addnl. resistance is offered by the product water on the cathode side. Some expts. have been carried out taking this phenomenon into account. Thermal management is also a crit. issue for better performance of **fuel cell** stacks. Improper coolant plant design leads to non-uniformity in temp. distribution across the stack. Various coolant flow field designs have been tried out to optimize the temp. distribution. Results of the expts. are discussed.

CC 52-0 (Electrochemical, Radiational, and Thermal Energy Technology)

ST review **polymer electrolyte membrane fuel cell** stack design

IT **Fuel cells**
(tech. issues pertaining to **polymer electrolyte membrane fuel cell** stack design)

L22 ANSWER 12 OF 75 HCAPLUS COPYRIGHT 2004 ACS on STN

1999:814071 Document No. 132:38148 **Solid polymer electrolyte fuel cells** using metal thin sheet separators. Saito, Kazuo; Kogami, Taiji; Tomozawa, Hiroshi; Ueno, Mitsuji (Toshiba Corp., Japan). Jpn. Kokai Tokkyo Koho JP 11354142 A2 19991224 Heisei, 32 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1998-163717 19980611.

AB The **fuel cell** comprises a stack contg. alternate unit cells and metal thin sheet separators, wherein (1) wavily press formed separators are used to form both the path for a fuel gas and the path for an oxidizer **gas**, (2) sheet **seal** members are arranged at the periphery of the separators to improve the strength of the separators, and (3) multiple **manifold** holes for supplying and discharging the reactive gases (fuel gas and oxidizer gas) and cooling medium are arranged at the seal members. Alternatively, a part of the separators is exposed out of the **fuel cells** for easily removing heat generated in the cells, and water vapor-selectively permeable membranes are arranged at a part of the cell stack to humidify the reactive gases by using water included in the reacted gas, so that the **fuel cells** do not require the another gas-humidifying system. Alternatively, cooling medium having .ltoreq.0.degree. f.p. is used in the **fuel cells**, so that the **fuel cells** can be used in a wide temp. region. Alternatively, the separators are metal thin sheets having excellent ductility and shallow grooves on the surfaces as the paths for the reactive **gases**, and sheet **seal** members are arranged at the periphery of the separators.

IC ICM H01M008-02
ICS H01M008-02; H01M008-10; H01M008-24

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST polymer electrolyte **fuel cell** separator metal

IT **Fuel cell** separators
(metal thin sheet; **solid polymer electrolyte fuel cells** using metal thin sheet separators)

IT **Solid** state **fuel cells**
(**polymer electrolyte; solid polymer electrolyte fuel cells** using metal thin sheet separators)

IT Aluminum alloy, base
Copper alloy, base
(separators; **solid polymer electrolyte fuel cells** using metal thin sheet separators)

L22 ANSWER 13 OF 75 HCAPLUS COPYRIGHT 2004 ACS on STN

1999:383438 Document No. 131:33809 2-D, non-isothermal mathematical model and performance analysis of an oxygen-hydrogen **PEM**

fuel cell. Gurau, Vladimir; Liu, Hongtan; Kazim, Ayoub (Mechanical Engineering Department, University of Miami, Coral Gables, FL, 33124, USA). Energy and the Environment, Proceedings of the Trabzon International Energy and Environment Symposium, 2nd, Trabzon, Turk., July 26-29, 1998, Meeting Date 1998, 527-533. Editor(s): Dincer, Ibrahim; Ayhan, Teoman. Begell House: New York, N. Y. (English) 1999. CODEN: 67TJA9.

AB A two-dimensional (2-D), non-isothermal math. model for the entire sandwich of a proton exchange membrane (**PEM**) **fuel cell** including the gas channels is developed. To take into consideration the real concn. distributions along the interface between the gas diffuser and catalyst layer, transport equations are solved simultaneously for the domain consisting of the coupled gas channel, gas diffuser, catalyst layer, and membrane. The self-consistent schematic model for porous media is used for the equations describing transport phenomena in the membrane, catalyst layers, and gas diffusers, while std. Navier-Stokes, energy transport, continuity, and species concn. equations are solved in the gas channels. The oxygen mole fraction **distribution** in the coupled cathode **gas** channel-gas diffuser is studied. Influences of the **inlet** conditions at the gas channel entries and of the gas diffuser porosity on the cell performance are also analyzed.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST modeling proton exchange membrane **fuel cell** performance; oxygen hydrogen proton exchange membrane **fuel cell**

IT **Fuel cells**
(proton exchange membrane; two-dimensional, non-isothermal math. model and performance anal. of oxygen-hydrogen proton exchange membrane **fuel cells**)

IT Simulation and Modeling, physicochemical
(two-dimensional, non-isothermal math. model and performance anal. of oxygen-hydrogen proton exchange membrane **fuel cells**)

L22 ANSWER 14 OF 75 HCAPLUS COPYRIGHT 2004 ACS on STN

1999:188076 Document No. 130:198760 Two-dimensional model for the entire sandwich of a **PEM fuel cell**.
Gurau, Vladimir; Barbir, Frano; Liu, Hongtan (Energy Partners, Technology Center, West Palm Beach, FL, 33407, USA). Proceedings - Electrochemical Society, 98-27(Proton Conducting Membrane Fuel Cells II), 479-503 (English) 1999. CODEN: PESODO. ISSN: 0161-6374. Publisher: Electrochemical Society.

AB A two-dimensional, non-isothermal math. model for the entire sandwich of a proton exchange membrane (**PEM**) **fuel cell** including the gas channels has been developed. In order to take into consideration the real concn. distributions along

the interface between the gas diffuser and catalyst layer, transport equations are solved simultaneously for the domain consisting of the coupled gas channel, gas diffuser, catalyst layer, and membrane. The self-consistent schematic model for porous media is used for the equations describing transport phenomena in the membrane, catalyst layers, and gas diffusers, while std. Navier-Stokes, energy transport, continuity and species concn. equations are solved in the gas channels. A special handling of the transport equations enabled us to use the same numerical method to solve them, and therefore to treat the gas channel-gas diffuser-catalyst layer domains as an entirety, avoiding arbitrary boundary conditions at their interfaces. The oxygen mole fraction **distribution** in the coupled cathode **gas** channel-gas diffuser is studied for different values of the operating c.d. Influences of the **inlet** conditions at the gas channel entries and of the gas diffuser porosity on the cell performance are also analyzed.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST modeling proton exchange membrane **fuel cell**

IT **Fuel cells**
(two-dimensional modeling of entire sandwich of proton exchange membrane **fuel cells**)

IT Simulation and Modeling, physicochemical
(two-dimensional; two-dimensional modeling of entire sandwich of proton exchange membrane **fuel cells**)

L22 ANSWER 15 OF 75 HCAPLUS COPYRIGHT 2004 ACS on STN

1998:747702 Document No. 130:5715 Integral **polymer electrolyte membrane (PEM) fuel -cell** heating module and its use, and **PEM fuel-cell** stack. Rohland, Bernd; Scholta, Joachim; Zettisch, Georg; Epple, Wolfgang; Plzak, Vojtech (Zentrum fuer Sonnenenergie- und Wasserstoff-Forschung Baden-Wuerttemberg Gemeinnuetzige Stiftung, Germany). PCT Int. Appl. WO 9850975 A1 19981112, 24 pp. DESIGNATED STATES: W: CA, US; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (German). CODEN: PIXXD2. APPLICATION: WO 1998-DE1271 19980504. PRIORITY: DE 1997-19718970 19970505.

AB The heating module comprising a **PEM fuel-cell** stack, where each **fuel cell** in the stack has a **PEM**, an anode on 1 side of the membrane and a cathode on the other side, a **gas-distribution** layer on the anode side, a **gas-distribution** layer on the cathode side, in addn. to bipolar plates bordering on the **gas-distribution** layers. The anode is configured as a 3-layer anode with a CO and/or MeOH vapor oxidn.-selective catalyst layer on the side facing away from the membrane, and an electrochem. active layer on the side facing the membrane, in addn. to a contact layer made of porous C paper between

the 2 layers. The **gas-distribution** layer on the cathode side has air ducts with open **inlets** and **outlets.** The module also comprises a thermally insulating gastight, tubular, hollow jacket surrounding the stack, a MeOH reformer which produces a H combustion gas contg. CO and MeOH vapor from H2O vapor and MeOH. H2O vapor prodn. of and reformer heating are produced by a catalytic residual gas burner. The module also contains a circulation fan arranged inside the hollow jacket and circulating damp air through the air ducts of the cathode **gas-distribution** layer. The inventive heating module is suitable for use in a **fuel cell** installation for supplying household energy.

IC ICM H01M008-24
ICS H01M008-04; H01M008-06

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **polymer electrolyte membrane** **fuel cell** stack; heating module **fuel cell** stack

IT Heaters
(integral **polymer electrolyte membrane fuel-cell** heating module and its use)

IT **Fuel cells**
(**polymer electrolyte membrane;** integral heating module and its use and **PEM fuel-cell** stack)

L22 ANSWER 16 OF 75 HCAPLUS COPYRIGHT 2004 ACS on STN

1998:684682 Document No. 129:304511 **Solid polymer electrolyte fuel cell** stacks. Urabe, Kyoichi (Fuji Electric Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 10284096 A2 19981023 Heisei, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1997-82812 19970401.

AB The **fuel cell** stacks have unit cells, contg. a flat **polymer electrolyte membrane** held between an electrode pair, stacked in horizontal direction with **gas** non-permeable **separators** having reaction **gas** passages facing the electrodes, where the **separator** has a reaction **gas inlet** at the upper part, a reaction gas **outlet** at the lower part, and a groove bypassing the reaction gas passage and extending downward from the **inlet** to the **outlet.** This structure prevents condensation of water in the reaction gas passage.

IC ICM H01M008-02
ICS H01M008-10; H01M008-24

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST polymer electrolyte **fuel cell** gas passage;

condensation prevention **fuel cell** gas passage

IT **Fuel cells**
(structure of reaction gas passages in **solid polymer electrolyte fuel cells** for preventing condensation)

L22 ANSWER 17 OF 75 HCAPLUS COPYRIGHT 2004 ACS on STN
1998:684681 Document No. 129:304510 **Solid polymer electrolyte fuel cells.** Urabe, Kyoichi (Fuji Electric Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 10284095 A2 19981023 Heisei, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1997-82811 19970401.

AB The **fuel cells** have a flat **polymer electrolyte membrane** joined with its 2 main surfaces to an electrode pair, **gas** non-permeable **separators** having reaction **gas** passages facing the electrodes, reaction gas **inlet** and **outlet** for the reaction **gas** passage on the **separator**, and an auxiliary reaction **gas inlet** on each **separator** at the central part of the reaction gas passage. This structure prevents condensation of water in the reaction gas passage.

IC ICM H01M008-02
ICS H01M008-04; H01M008-10; H01M008-24

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST polymer electrolyte **fuel cell** gas passage; condensation prevention **fuel cell** gas passage

IT **Fuel cells**
(structure of reaction gas passages in **solid polymer electrolyte fuel cells** for preventing condensation)

L22 ANSWER 18 OF 75 HCAPLUS COPYRIGHT 2004 ACS on STN
1998:627286 Document No. 129:233120 Separators and their manufacture for **solid polymer electrolyte fuel cells.** Shimotori, Soichiro; Muneuchi, Atsuo (Toshiba Corp., Japan). Jpn. Kokai Tokkyo Koho JP 10255824 A2 19980925 Heisei, 9 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1997-61295 19970314.

AB The separators, inserted between unit cells in a **solid polymer electrolyte fuel cell** stack, have a graphite contg. flexible substrate having press molded reaction gas passages on both sides and reaction gas **inlet** and **outlet** holes connected to the passages. The separators are prepd. by pressing the substrate to form the gas passages, the **inlet** and **outlet** holes, and **gas leak** preventing ribs on either or both sides.

IC ICM H01M008-02